TVSTUDY

INSTALLATION AND UPGRADE GUIDE

Office of Engineering and Technology
Federal Communications Commission
Washington, DC 20554

February 19, 2016

version 2.0

(this page is intentionally blank)

TABLE OF CONTENTS

UPGRADING FROM TVSTUDY 1.3.2 (PATCHED)

The following text will guide you through the process of upgrading 1.3.2 (Patched) to the latest version, 2.0, implementing the new Interference Check and OET-74 study modes, among other features. (Please note that version 1.3.2 (Patched) remains the final version of the TVStudy software for purposes of the incentive auction, and is still available for download at: http://data.fcc.gov/download/incentive-auctions/OET-69/.) It is strongly recommended that you upgrade only from versions 1.3.2 or 1.3.2 (Patched), since upgrading from older versions of the software could require you to drop and recreate the database. Otherwise, you should Uninstall and then Install the database again using the Manage Database window, instructions for which are found on Page 6 of the TVStudy manual.

Downloading the TVStudy Files

From the FCC TVStudy website, you will need to obtain one of the two files listed below.

> **2016Feb_tvstudy_mac_files.tgz** – Contains all of the necessary code and executables to run TVStudy 2.0 on the Mac platform.
> **2016Feb_tvstudy_linux64_files.tgz** – Contains all of the necessary code and executables to run TVStudy 2.0 on the Linux platform.

These files have been posted to https://www.fcc.gov/oet/tvstudy and can be downloaded by the end user. The .tgz file should then be unzipped to the directory that TVStudy is contained in, overwriting some older files. The .tgz file has this file structure found on the next page.

Move the country_poly.dat file into the data/ directory after extracting. If you have not done so, you may want to download the Terrain Database Test and Verification Utility and place its files in the dbase/ directory.

Please see the notes on page 6 before attempting to launch TVStudy 2.0.

It is highly recommended that Mac users running Mac OS X 10.9 ("Mavericks") or newer disable "App Nap", if they have not already done so, since that operating system feature will cause poor performance with TVStudy. To do so, open a terminal and enter this command:

```
defaults write gov.fcc.TVStudy NSAppSleepDisabled -bool YES
```

It is also possible to disable AppNap on your system entirely, but the instructions for doing so are beyond the scope of this document.

If you overwrote the existing files, you should now be done, unless you need to recompile TVStudy. (See page 13 for more information on recompiling TVStudy.)

TVStudy Files Download Data Structure

```
dev/
      build/                  (empty)
      Makefile
      Manifest.txt
      src/        (21 items)  (this is the source code for compilation)
help/
      manual.pdf
lib/
      api_login.props
      cdbs_table_defs.dat
      check_install
      mysql-jdbc.jar
      pair_study_post
      tvstudy
      tvstudy-api.jar
      tvstudy-core.jar
      tvstudy-gui.jar
      xercesImpl.jar
country_poly.dat              (Updated international border data)
tvstudy.jar
```

Notes About TVStudy Upgrades

TVStudy 2.0 on the Mac no longer launches using the TVStudy.app launcher and must be launched with the tvstudy.jar file or from the command line using the same method as in Linux.

Attempting to import the November 2015 CDBS Extracts (or older) provided for incentive auction-related analysis into TVStudy 2.0 and newer will result in an error that the app_tracking.dat and am_ant_sys.dat files are missing. To correct this, simply download copies of those files from the current CDBS and place them in the directory with the extracts. The datasets should then import successfully.

TVStudy 2.0 now requires the Java 8 JDK. Users of the Mac can download it here:

http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

Linux users can use their normal method involving the package manager to install the `openjdk-8-jdk` package. If this is not available, Ubuntu users may need to run these commands first:

```
sudo apt-add-repository ppa:openjdk-r/ppa -y
sudo apt-get update
```

Please be sure the Java 8 JDK is installed before attempting to launch TVStudy 2.0. If you encounter problems when launching, try uninstalling older versions of Java. To uninstall Java 6 on the Mac, run these commands:

```
sudo rm -rf /System/Library/Java/JavaVirtualMachines/1.6.0.jdk
sudo rm -rf /Library/Java/JavaVirtualMachines/1.6.0*.jdk
```

To uninstall older Java versions on Linux, use the normal method involving the package manager. For example, an Ubuntu user may need to run this command:

```
sudo apt-get remove openjdk-7-jre icedtea-7-jre-jamvm openjdk-7-
jre-headless
```

INSTALLING TVSTUDY FOR THE FIRST TIME

In most cases, installing TVStudy is straightforward; both the Mac and 64-bit Linux versions come with pre-compiled executables. Compilation instructions are included in this document in case the user is attempting to install on a 32-bit Linux or would like to recompile after making modifications. (Modifications are not recommended if the intent is to produce results matching those produced by the FCC.) On the Mac platform, Mac OS 10.6 ("Snow Leopard") or newer is required; the FCC is presently running Mac OS 10.11 ("El Capitan").

Disclaimer: The TVStudy software was developed using MySQL Community Server version 5.5.29 and has been tested with version 5.7.10; it may or may not work with other versions. The MySQL server typically runs on the same computer as TVStudy itself, and these instructions assume that this is the case. Please note that you must have administrator privileges on your computer to complete this process; you will be prompted to enter your password several times.

Installing TVStudy on a Mac

Installing and Configuring MySQL

Download a copy of MySQL Community Server from: http://www.mysql.com/downloads/mysql/

Open the "mysql-5.7.10-osx10.10-x86_64.dmg" disk image file. Install the package "mysql-5.7.10-osx10.10-x86_64.pkg". Use the default install location. When it is finished installing, open System Preferences, select the "MySQL" icon, and click the button "Start MySQL Server". The box "Automatically Start MySQL Server on Startup" may be checked so the server is always running. This should not affect normal computer operations. If you do not check the box, you will have to open System Preferences and make sure the server is running before each use of TVStudy.

Launch the Terminal application. At the prompt, open the MySQL monitor by entering:

```
/usr/local/mysql/bin/mysql -u root
```

At the MySQL command prompt, enter the following commands, exactly as shown except for replacing the quoted text string `'pass_here'` with your desired root password. Note: If you choose to copy and paste the commands from this manual, be aware that you should first copy the first line up to, but not including, the semicolon (;). Doing so will enable you to edit the `'pass_here'` field in the terminal window. When you are finished editing your password, add the semi-colon at the end of the line and press return. Then, enter the command `flush privileges;`

```
update mysql.user set password = password('pass_here') where user = 'root';
flush privileges;
```

Close the MySQL monitor by entering the `exit` command. You may now close the terminal window.

Installing and Configuring TVStudy

From the FCC TVStudy website, you will need to obtain the three files listed below.

2013Jan_tvstudy_data_files.tgz – Contains all of the necessary data files.
2016Feb_tvstudy_data_updates.tgz – Contains updates to the necessary data files.
2016Feb_tvstudy_mac_files.tgz – Contains all of the necessary code and executables.

Due to the large file size, **2013Jan_tvstudy_data_files.tgz** was split into seven segments of about 2 GB each. Those seven segments have been posted to https://www.fcc.gov/general/tvstudy-interference-analysis-software and can be downloaded, verified, and concatenated by the end user as described below. The resulting .tgz file is then unzipped to recover four data directories and their contents. The unzipped files are approximately 25GB in size. The seven segments can be concatenated using a concatenation utility such as Split & Concat to recreate the .tgz file.

To minimize the possibility of uncorrectable transmission errors, parity archive (PAR2) files with Reed-Solomon error correction (5% redundancy) were created. While not strictly required to recover the original .tgz file, it is recommended that the user also download the PAR2 files and use appropriate software to verify (and correct if necessary) the .tar file is complete. A number of no-cost applications are available for utilizing the PAR2 functionality to verify and correct the .tgz segment files, including MacPAR Deluxe.

You should extract the files into a directory called TVStudy/ in the /Applications/ directory. Once these files are extracted, you should have a directory structure which looks like the one shown at the end of this section. You may need to move any .dat files in the root to the data/ directory.

Two optional data files, **CDED** and **2013Mar_nlcd**, are also available at the URL above. These contain high-resolution terrain data for Canada (Canadian Digital Elevation Data) and U.S. National Land Cover Data. The CDED dataset is about 34 GB in size and the NLCD dataset is about 2 GB. There is some overlap of the USGS National Elevation Dataset (DEM, included with the 2013Jan_tvstudy_data_files) in Canada, so the CDED dataset should not be needed except for certain studies in Canada outside the U.S.-Canada border areas. Note, however, that the FCC uses the CDED dataset for all 1-second terrain calculations involving Canada and the NED and CDED elevation data are not identical. The NLCD is used as a reference for clutter adjustments in studies using the method of OET Bulletin No. 73 and is not used in the method of OET Bulletin No. 69 or OET Bulletin No. 74.

It is highly recommended that Mac users disable "App Nap" since that operating system feature will cause poor performance with TVStudy. To do this, open a terminal and enter this command:

```
defaults write gov.fcc.TVStudy NSAppSleepDisabled -bool YES
```

It is also possible to disable AppNap on your system entirely, but the instructions for doing so are beyond the scope of this document.

You may now proceed to the Launching TVStudy section of this document on page 15.

TVStudy Directory Structure

```
/Applications/TVStudy/
   cache/                          (directory is initially empty)
   cdbs/
      22Feb2012/                   (this is CDBS data from February 22, 2012)
   data/
      country_poly.dat
      pop_ca_2006.dat              (this is 2006 Census data for Canada)
      pop_ca_2011.dat              (this is 2011 Census data for Canada)
      pop_mx_2010.dat              (this is beta 2010 Census data for Mexico)
      pop_us_2000.dat              (this is 2000 Census data for the US)
      pop_us_2010.dat              (this is 2010 Census data for the US)
      pop_usterr_2000.dat          (this is 2000 Census data for US territories)
      pop_usterr_2010.dat          (this is 2010 Census data for US territories)
   dbase/
      cded/       (empty)     (this is a placeholder for Canadian terrain data)
      cem/        (223 files)       (these are Mexican terrain data)
      gtopo/      (25,537 files)    (these are 30-second terrain data)
      nadcon/     (28 files)        (these are data for converting between datums)
      ned/        (1,964 files)     (these are 1-second terrain data)
      nlcd/       (empty)           (this is a placeholder for clutter data)
      srtm/       (719 files)       (these are SRTM terrain data)
      usgs/       (1,362 files)     (these are U.S. 3-second terrain data)
   dev/
      build/                        (empty)
      Makefile
      Manifest.txt
      src/        (21 items)        (this is the source code for compilation)
   help/
      manual.pdf                    (instruction manual for TVStudy)
   lib/
      api_login.props
      cdbs_table_defs.dat
      check_install
      mysql-jdbc.jar
      pair_study_post
      tvstudy
      tvstudy-api.jar
      tvstudy-core.jar
      tvstudy-gui.jar
      xercesImpl.jar
   out/                             (directory is initially empty)
   tvstudy.jar
```

Installing TVStudy on Linux

These instructions assume the use of a Debian-based Linux distribution, such as the popular Ubuntu 14.04.2 operating system. If you are using a different distribution, you will need to adjust these instructions accordingly. Additionally, the TVStudy executable provided was compiled for a 64-bit Linux system.

Installing and Configuring Prerequisites

To begin, you will need to install some prerequisites (MySQL server, Java, and PyPAR2). In a terminal window, enter the command:

```
sudo apt-get install mysql-server openjdk-8-jre pypar2
```

The system should install the prerequisite MySQL and PyPAR2 software, and should then ask you to set a root password for MySQL. Please make sure to note the root password for MySQL, as you will need it to configure and run TVStudy. If you are not prompted to create a root password, you will need to open a terminal and open the MySQL monitor by entering:

```
mysql -u root
```

At the MySQL command prompt, enter the following commands, exactly as shown except for replacing the quoted text string `'pass_here'` with your desired root password. Note: If you choose to copy and paste the commands from this manual, be aware that you should first copy the first line up to, but not including, the semicolon (;). Doing so will enable you to edit the `'pass_here'` field in the terminal window. When you are finished editing your password, add the semi-colon at the end of the line and press return. Then, enter the command `flush privileges;`

```
update mysql.user set password = password('pass_here') where user = 'root';
flush privileges;
```

Close the MySQL monitor by entering the `exit` command.

Installing and Configuring TVStudy

From the FCC TVStudy website, you will need to obtain the three files listed below.

2013Jan_tvstudy_data_files.tgz – Contains all of the necessary data.
2016Feb_tvstudy_data_updates.tgz – Contains updates to the necessary data files.
2016Feb_tvstudy_linux64_files.tgz – Contains all of the necessary code and executables.

Due to the large file size, **2013Jan_tvstudy_data_files.tgz** was split into seven segments of about 2 GB each. Those seven segments have been posted to https://www.fcc.gov/general/tvstudy-interference-analysis-software and can be downloaded and concatenated by the end user. The resulting .tgz file is then unzipped to recover the four data directories and their contents. The unzipped files are approximately 25GB in size. Once the seven segments are recovered, they can be concatenated using the `cat` command to recreate the .tgz file.

A sample command to concatenate the seven pieces is:

```
cat 2013Jan_tvstudy_data_files.tgz.001 2013Jan_tvstudy_data_files.tgz.002
2013Jan_tvstudy_data_files.tgz.003 2013Jan_tvstudy_data_files.tgz.004
2013Jan_tvstudy_data_files.tgz.005 2013Jan_tvstudy_data_files.tgz.006
2013Jan_tvstudy_data_files.tgz.007 > 2013Jan_tvstudy_data_files.tgz
```

To minimize the possibility of uncorrectable transmission errors, parity archive (PAR2) files with Reed-Solomon error correction (5% redundancy) were created. While not strictly required to recover the original .tgz file, it is recommended that the user also download the PAR2 files and use appropriate software to verify (and correct if necessary) the .tar file is complete. A number of no-cost applications are available for utilizing the PAR2 functionality to verify and correct the .tgz segment files, including the PyPAR2 utility installed previously.

Once these files are extracted, you should have a directory structure which looks like the one shown at the end of this section. You may need to move any .dat files in the root to the data/ directory.

Two optional data files, **CDED** and **2013Mar_nlcd**, are also available at the URL above. These contain high-resolution terrain data for Canada (Canadian Digital Elevation Data) and U.S. National Land Cover Data. The CDED dataset is about 34 GB in size and the NLCD dataset is about 2 GB. There is some overlap of the USGS National Elevation Dataset (DEM, included with the 2013Jan_tvstudy_data_files) in Canada, so the CDED dataset should not be needed except for certain studies in Canada outside the U.S.-Canada border areas. Note, however, that the FCC uses the CDED dataset for all 1-second terrain calculations involving Canada and the NED and CDED elevation data are not identical. The NLCD is used as a reference for clutter adjustments in studies using the method of OET Bulletin No. 73 and is not used in the method of OET Bulletin No. 69 or OET Bulletin No. 74.

If you are using a Linux installation that is not 64-bit, or otherwise determine that you need to compile TVStudy from source, please continue to page 13. Otherwise, you may advance to the Launching TVStudy section of this document on page 15.

TVStudy Directory Structure

```
cache/                              (directory is initially empty)
cdbs/
      22Feb2012/                    (this is CDBS data from February 22, 2012)
data/
      country_poly.dat
      pop_ca_2006.dat               (this is 2006 Census data for Canada)
      pop_ca_2011.dat               (this is 2011 Census data for Canada)
      pop_mx_2010.dat               (this is beta 2010 Census data for Mexico)
      pop_us_2000.dat               (this is 2000 Census data for the US)
      pop_us_2010.dat               (this is 2010 Census data for the US)
      pop_usterr_2000.dat           (this is 2000 Census data for US territories)
      pop_usterr_2010.dat           (this is 2010 Census data for US territories)
dbase/
      cded/       (empty)     (this is a placeholder for Canadian terrain data)
      cem/        (223 files)       (these are Mexican terrain data)
      gtopo/      (25,537 files)    (these are 30-second terrain data)
      nadcon/     (28 files)        (these are data for converting between datums)
      ned/        (1,964 files)     (these are 1-second terrain data)
      nlcd/       (empty)           (this is a placeholder for clutter data)
      srtm/       (719 files)       (these are SRTM terrain data)
      usgs/       (1,362 files)     (these are U.S. 3-second terrain data)
dev/
      build/                        (empty)
      Makefile
      Manifest.txt
      src/        (21 items)        (this is the source code for compilation)
help/
      manual.pdf                    (instruction manual for TVStudy)
lib/
      api_login.props
      cdbs_table_defs.dat
      check_install
      mysql-jdbc.jar
      pair_study_post
      tvstudy
      tvstudy-api.jar
      tvstudy-core.jar
      tvstudy-gui.jar
      xercesImpl.jar
out/                                (directory is initially empty)
tvstudy.jar
```

COMPILING TVSTUDY FROM SOURCE

These instructions assume the use of a Debian-based Linux distribution, such as the popular Ubuntu 14.04.2 operating system. If you are using a different distribution or the Mac, you will need to adjust these instructions accordingly.

In your terminal, enter the following command:

```
sudo apt-get install openjdk-8-jdk gfortran libmysqlclient-dev
```

This will install the additional prerequisites necessary to compile TVStudy.

You are now ready to build TVStudy. Enter:

```
cd dev
make
```

Waiting a few seconds should result in newly-compiled tvstudy, pair_study_post, and tvstudy.jar files. If it does not, you may need additional prerequisites or you may need to make additional modifications to dev/src/tvstudy.h or dev/Makefile in order to compile TVStudy successfully. Those instructions are beyond the scope of this document. Then enter:

```
make install
cd ..
```

These commands should place you back in the folder in which you placed the TVStudy files and allow you to continue to the "Launching TVStudy" section of this document on page 15.

Note: If you are using CentOS or another Red Hat-based operating system, you may need to adjust your Makefile. In CentOS, libmysqlclient.a is located in /usr/lib64/mysql, as opposed to /usr/lib/x86_64-linux-gnu as it is on Debian-based operating systems.

COMMENTS REGARDING TVSTUDY ON WINDOWS

An executable version of TVStudy is not provided for the Windows platform, but there is no reason to believe that it should not be possible to compile and run TVStudy on Windows. As such, this section is designed to obtain the appropriate files necessary, short of actual compilation of the code. As an alternative to compiling the TVStudy source code for direct execution under Windows, the user may wish to consider installing a virtual OS environment (such as Ubuntu under Oracle's VirtualBox) and running one of the supplied executables in a virtual machine.

From the FCC TVStudy website, you will need to obtain the data files and one of the two platform-specific files listed below.

2013Jan_tvstudy_data_files.tgz – Contains all of the necessary data files required to run TVStudy successfully. All users need to download this file.
2016Feb_tvstudy_data_updates.tgz – Contains updates to the necessary data files.
2016Feb_tvstudy_mac_files.tgz – Contains all of the necessary code and executables to run TVStudy on Mac OS or to compile TVStudy for Mac OS.
2016Feb_tvstudy_linux64_files.tgz – Contains all of the necessary code and executables to run TVStudy on 64-bit Linux or to compile TVStudy for Linux.

Due to the large file size, **2013Jan_tvstudy_data_files.tgz** was split into seven segments of about 2 GB each. Those seven segments have been posted to https://www.fcc.gov/general/tvstudy-interference-analysis-software and can be downloaded and concatenated by the end user. The resulting .tgz file is then unzipped to recover the four directories and their contents. The unzipped files are approximately 25GB in size. The seven segments can be concatenated using 7-Zip. Once 7-Zip is installed, right-click on the first segment (.001) and choose "Extract files..." from the menu.

To minimize the possibility of uncorrectable transmission errors, the seven segments have been used to create parity archive (PAR2) files with Reed-Solomon error correction (5% redundancy). While not strictly required to recover the original .tgz file, it is recommended that the user also download the PAR2 files and use appropriate software to verify (and correct if necessary) the eight segments comprising the .tar file. A number of no-cost applications are available for utilizing the PAR2 functionality to verify and correct the .tgz segment files, such as Multipar.

Please note that you will need to install Java 8 in order to use TVStudy.

LAUNCHING TVSTUDY

On the Mac, launch tvstudy.jar from Finder. In Linux (or on the Mac), use a terminal window to launch:

```
java -jar tvstudy.jar
```

Please note that the TVStudy.app file provided with TVStudy 1.3.2 (Patched) and earlier no longer works properly with TVStudy 2.0. Launching tvstudy.jar from Finder (on Mac), or launching tvstudy.jar from the command line (on Linux or Mac), is now the proper method for launching TVStudy.

On the Mac, prior to launching TVStudy 2.0, you will need to install Java 8. This can be downloaded from the Oracle Java website, and instructions for its installation are found on page 6.

Upon first login, TVStudy will open the "Manage Database" window and prompt you to update your database to the latest version if you are upgrading, or install the root database for a new installation. Click "Update" or "Install," as appropriate, and it will do so automatically, taking up to about 20 minutes, though it could be more depending on the speed of your computer.

For instructions on using TVStudy, please refer to the TVStudy manual.

CHANGE LOG

Differences Between 1.3.2 (Patched) and Older Versions

The change logs for older versions of TVStudy have been removed from this document. However, the Installation and Upgrade Guide for 1.3.2 (Patched) is still available at the link below, and contains the changelog for all previous versions of TVStudy.

http://data.fcc.gov/download/incentive-auctions/OET-69/2015Oct_TVStudyInstallationGuide.pdf

Differences Between 2.0 and 1.3.2 (Patched)

The Mac version of TVStudy 2.0 can no longer use the TVStudy.app file contained with past TVStudy releases. On a Mac, TVStudy 2.0 may be started by directly opening the tvstudy.jar file from Finder, or from the command line using the same method described in the manual for Linux.

Updated the stations.csv file output during a pair study to specify NAD83 coordinates rather than NAD27 coordinates. All TVStudy outputs now have NAD83 coordinates in them.

Corrected the treatment of Digital Replacement Translators (DRTs) which were previously being treated as mutually exclusive with the parent station even when they operate on different channels. However, please note that if two DRTs are on the same channel and within 30 km of each other, they will still be treated as mutually exclusive.

Improved caching functionality when using smaller cell sizes. TVStudy now writes to cache after calculating 1,000,000 fields instead of waiting for all field calculations to be complete. This prevents TVStudy from waiting, for example, more than an hour before writing to cache when using 0.1 km cell size.

Added the ability to queue studies. This means that if you start multiple pair studies, or more non-pair studies than the amount for which memory has been allocated, TVStudy will treat them as a queue and run the studies in the order they are started.

TVStudy now outputs the parameters in a separate tvstudy_settings.txt output file, instead of at the bottom of the tvstudy.txt file. This tvstudy_settings.txt file also contains the rules used in the study.

TVStudy can now output detailed and summary tvstudy.txt files. The summary tvstudy.txt file is primarily useful with the new Interference Check study mode.

Added the ability to output KML map files as an alternative to the ESRI ShapeFile map files.

A new cell file output format is available called "Detail CSV". This creates a set of CSV files with equivalent information as the existing detail cell file format.

Map file output now includes undesired station records in the "sources" file.

Station data, e.g. CDBS, LMS, and study templates, are no longer managed from the "New Study" window. Separate "Station Data Manager" and "Template Manager" windows are now used to import, export, and generally manage station data sets and study templates. Station data may also be viewed in a separate station data search window without first creating a study and scenario.

Added the ability to import station data from LMS download files.

CDBS data imports now require additional download files, as noted in Appendix B of the TVStudy 2.0 Manual.

TVStudy can now adapt to changes in CDBS and LMS download file structures without requiring a full update to the software, as long as the changes do not directly affect the table columns used by TVStudy. For LMS data this process is fully automatic because the column names are embedded in the download files themselves. For CDBS data a new table definition file installed with TVStudy, "lib/cdbs_table_defs.dat", provides the column names. Most changes to CDBS can be handled by updating that file alone. However, with CDBS there is no "backwards compatibility"– if the table definitions file is updated, TVStudy will no longer be able import CDBS data in the earlier format(s). A potential workaround could be to keep multiple versions of the table definitions file and manually exchange the installed file as needed. Please note that TVStudy must be shut down and restarted any time this lib/cdbs_table_defs.dat file is changed.

Added the ability to create and permanently save new station records in a "User Records" data set. New records may be created from scratch, or by duplicating and modifying records from an imported station data set. Each user record is assigned a permanent ID number that may be used to locate the record again in the future. The user records data set may also be searched by call sign, etc. as with other station data sets. Currently, user records cannot be deleted.

The station data search window has greatly enhanced capabilities. This window appears when adding a single station record to a scenario in a study. The window may also appear in other contexts, such as when viewing station data outside any study. This window allows searching station data by various criteria, as before. It now also allows any record appearing in the search results to immediately be viewed in a record editor while the search window is still active. It is also possible to create and edit new records, and if appropriate, save those as user records. Individual station records may also be imported and exported using XML files.

Added the ability to conduct interference check studies, as *tv_process*, the FCC's application processing tool, does. This includes the functionality which checks distance to AM stations, distance to the border, distance to land mobile and monitoring stations, and other functions familiar to those who use *tv_process* or similar tools. Please note that while the baseline analysis mode is fully functional in this version of TVStudy, it will likely be modified in a future TVStudy release upon additional guidance from the Media Bureau.

Created a new study type for evaluating interference between FM stations using procedures analogous to those described in OET Bulletin 69. FM station data sets can be imported from CDBS download files, or FM records can be created manually within the application.

Created a new study type for evaluating interference from wireless base stations to TV station coverage, using the procedures described in OET Bulletin 74. Wireless base station data sets can be imported from CSV files, or wireless records can be created manually within the application. In the new study type, wireless records can be added to study scenarios along with a desired TV station record and optional undesired TV stations for "masking" interference. Wireless records do not have frequency and bandwidth values when first imported, those values are assigned to all wireless records in a particular study scenario using parameters.

When a study is run, default values are now automatically applied to study parameters that don't already exist in a particular study. It is no longer necessary to manually open and save all studies after a software update has added new parameters to the default template.

Added a separate parameter for the number of radials used in calculating HAAT. The old HAAT radial switch is now used exclusively to set the number of HAAT radials used in computing the contour.

Added parameters to support a range of “Rule Extra Distances.” The extra distance is added to interference rule culling distances to ensure that initial searches done using station-to-station distances will not miss stations that are close enough to pass the station-to-cell distance check done in the actual study. The changes allow this distance to vary by desired station ERP, so smaller distances are used for stations that will have smaller service contours, reducing the number of unnecessary stations included in a search.

A new filtering capability has been added to tables that list station data records and interference rules in various user interface contexts. A set of menus appearing below the table can be used to "drill down" into the table contents by selecting filter terms by column.

Any study can now contain records from many different imported station data sets. When a study is first created an associated data set may still be selected, however that is now just a default for the user interface and is no longer required; the data set menu has a "(None)" option. Regardless of the selected default, any available data set may be chosen during searches that add records to a study scenario.

Frequency in MHz is now displayed alongside channel for TV and FM stations.

TVStudy now has a web API, and a servlet for use with Apache Tomcat is available on the TVStudy website. However, since this is an advanced function intended primarily for software developers and is not one used by OET, no support is being provided for this functionality.

TROUBLESHOOTING

Problems Running TVStudy

Below are some common errors and suggestions for troubleshooting.

- **Exception in thread "main" java.lang.UnsupportedClassVersionError: gov/fcc/tvstudy/AppManager : Unsupported major.minor version 51.0**

  This message or one like it, seen on the command line in Linux, usually means that you have two versions of Java installed, and TVStudy is attempting to launch using the older one. To resolve this issue, remove the older version of Java from your system, using the normal method of removing such software.

- **The database needs to be updated, but studies are currently in use.**

  Assuming your database is not currently in use by TVStudy by either yourself or another user, it is possible the database was left in an unclean state with locked databases. To unlock all of your databases and allow the update to proceed, in the Manage Database window, click "Unlock All," and then "Update." The update should complete successfully.

  If the problem is not resolved, you may try to drop the database, as described below.

- **The database is being updated by another application, or is damaged.**

  This can happen when a database update fails. If this happens, the simplest method of repair is to drop the database and rebuild from scratch. To do this, in the Manage Database window, click "Uninstall," and then "Install." Click "Open" and TVStudy should open successfully.

  If, after doing the above steps, the database fails to install correctly, you most likely do not have the file structure correct. Ensure that your data/ contains all of the appropriate files and that your file structure matches the ones found on pages 9 or 12, then repeat the steps in the above paragraph.

  The database can also fail to install correctly when TVStudy is running from a location other than the directory which contains the other TVStudy directories such as data/. If so, simply close TVStudy and launch it again from the correct location.

Contact Information

If you encounter any problems and wish to speak with someone at the FCC about TVStudy, please e-mail Mark J. Colombo at the following address: mark.colombo@fcc.gov

LICENSING INFORMATION

TVStudy

MySQL Libraries

Oracle's FOSS License Exception Terms and Conditions

1. Definitions.

   "Derivative Work" means a derivative work, as defined under applicable copyright law, formed entirely from the Program and one or more FOSS Applications.

   "FOSS Application" means a free and open source software application distributed subject to a license listed in the section titled "FOSS License List."

   "FOSS Notice" means a notice placed by Oracle or MySQL in a copy of the MySQL client Libraries stating that such copy of the MySQL Client Libraries may be distributed under Oracle's or MySQL's FOSS (or FLOSS) License Exception.

   "Independent Work" means portions of the Derivative Work that are not derived from the Program and can reasonably be considered independent and separate works.

   "Program" means a copy of Oracle's MySQL Client Libraries that contains a FOSS Notice.

2. A FOSS application developer ("you" or "your") may distribute a Derivative Work provided that you and the Derivative Work meet all of the following conditions:

   a. You obey the GPL in all respects for the Program and all portions (including modifications) of the Program included in the Derivative Work (provided that this condition does not apply to Independent Works);

   b. The Derivative Work does not include any work licensed under the GPL other than the Program;

   c. You distribute Independent Works subject to a license listed in the section below titled "FOSS License List";

   d. You distribute Independent Works in object code or executable form with the complete corresponding machine-readable source code on the same medium and under the same FOSS license applying to the object code or executable forms;

   e. All works that are aggregated with the Program or the Derivative Work on a medium or volume of storage are not derivative works of the Program, Derivative Work or FOSS Application, and must reasonably be considered independent and separate works.

3. Oracle reserves all rights not expressly granted in these terms and conditions. If all of the above conditions are not met, then this FOSS License Exception does not apply to you or your Derivative Work.

Apache Xerces Library

Apache License
Version 2.0, January 2004
http://www.apache.org/licenses/

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the

Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

   (a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

   (b) You must cause any modified files to carry prominent notices stating that You changed the files; and

   (c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

   (d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution

notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.